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Vol. XIII.

FEBRUARY, 1907.

No. 5.

THE AGRICULTURAL STUDENT



CRUDE PETROLEUM AS A PREVENTATIVE
AGAINST FROST—W. G. YEAGER.

CONFINEMENT vs. OPEN LOT FOR FEEDING
CATTLE—GUS. L. ELLIOT.

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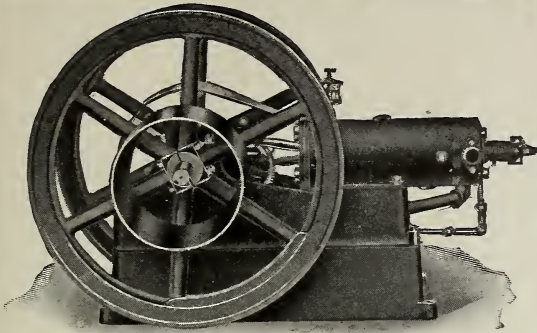
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VOL. XIII. OHIO STATE UNIVERSITY, COLUMBUS, FEBRUARY, 1907 No. 5

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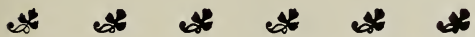
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EDITORIAL NOTES

The American Breeders' Association and allied meetings of last week created unusual interest, judging from the number of visitors present. Both the University Chapel and the Chemical Hall were crowded during several sessions. The average attendance for each session was no less than one thousand. We regret that several of the speakers whose names appeared on the program were not present to deliver what was hoped would be interesting addresses. A few papers were read, however, in the absence of the authors, while others will be published later in reports of the meeting.

Plant Section of the A. B. A.

The first meeting of the plant section of the A. B. A. was held Tuesday afternoon, January 15, in Chemical hall. Hon. Charles Willis Ward presided at the plant section meetings. Quite a large number were present to hear the first address on the program given by Dr. G. H. Shull, of Cold Spring Harbor, N. Y. He gave a very interesting talk on "Importance of the Mutation Theory in Practical Breeding," and brought

out the necessity of practicing this theory if we wish to produce better plants. No matter what plants we are working with we can by having large numbers of them, find one which differs from all the others and if this plant has some or all of the qualities desired we can take this and put it in an isolated place where outside pollination cannot take place except by hand. In this way we can readily see the value of the mutation theory in producing plants which have the qualities desired. Dr. Shull has been doing some very interesting and important work along this line and has obtained some good results from certain plants.

The next address was made by Mr. Porner, of Lafayette, Ind., on "Carnation Breeding," bringing out things of interest to all breeders of plants.

Mr. J. B. Norton, of Washington, D. C., gave an address on "Breeding Oats," and by the interest shown by nearly every member of the audience we should say that this was one of the most important subjects to the farmers of Ohio on the program of the plant section. There is no doubt but what the farmers of Ohio could do a great deal in increasing the oat yield by breeding a variety of oats that is adapted to their section of the state in which they live. Our oat crop is very important and work along the line of breeding them has progressed rather slowly. It is very true that we can get very striking results from breeding oats if we would only give a little of our attention to it.

On Wednesday morning the reports of several of the standing committees were received, these committees having been appointed last year at the A. B. A. convention to investigate and report upon certain lines of work.

After the reports of the different

committees we had the pleasure of listening to a most important address on "Corn Breeding and Registration," by C. G. Williams, of the Ohio Experiment Station at Wooster. Every one at the meeting was very much pleased with Mr. Williams' talk and some got up and expressed that it was the best paper on corn breeding that they have ever read or heard. We hope that this paper will be widely published so that every farmer who grows corn may read it.

"Tobacco Breeding in Ohio," by Prof. A. F. Selby, of the Ohio Experiment Station, was very interesting and showed some very important work being done along that line.

Taken as a whole the program of the plant section of the A. B. A. was very good. There is no doubt but what there were some subjects discussed which were not interesting to the farmers of Ohio as other subjects, but we must remember that the A. B. A. meetings are not for the benefit of Ohio farmers alone, but for every farmer in every part of the United States. I have heard a few farmers express themselves as not liking the program on account of some subjects of little importance to them, but they forget that there were some who were interested in those topics.

The meeting of the Ohio Plant Breeders' Association was held in the State House, Department of Agriculture. The officers of the previous year were re-elected and reports were received. Let us hope that this association will become stronger every year as it is a great power in the crop improvement of this state.

Agricultural Special Train

Last summer negotiations were begun by the freight department of the Cincinnati Northern division of the Big Four Railroad with the College of Ag-

riculture for the running of an agricultural special train over their lines in Ohio. The college agreed to organize the trip and furnish the speakers if the railroad would furnish the train. This was done and the day before Christmas two passenger coaches were set in Columbus and turned over to the college to instal any exhibits that they cared to carry on the train. Early on the morning of December 26 the train left Columbus with Professors Price, Foord and McCall, of the Agricultural College, Director Thorne, L. H. Goddard, C. N. Kyle, of the Experiment Station, J. M. McCord, secretary of the State Grain Dealers Association, J. E. Wing, of Mechanicsburg, C. A. McIntyre, of Chandlerlsville, and others on board.

The trip was begun at Germantown, in Montgomery county, and ended at West Unity, in Williams county, and crossed, Preble, Darke, Mercer, Van Wert Paulding and Defiance counties, covering in all 145 miles and making 17

stops of 45 minutes each. The trip occupied two and a half days and one evening meeting was held. Over 2300 farmers were addressed on the trip and every one connected with the train was enthusiastic over its success. The audiences were attentive and anxious to hear every word the speakers had to say and the only regret that was heard was the fact that the train could not stop longer. The trip lay through the heart of the corn belt of Ohio and the newest farm lands in the state. A large part of Northwestern Ohio was one time known as the great black swamp, and less than twenty-five years ago deer were hunted on the fields that today are the most fertile corn lands of the state. In the last decade these lands in many cases have doubled in value and today Illinois farmers are selling their corn farms and investing in these Ohio farms, which are selling for \$100 to \$125 per acre. The potential fertility of this land is almost unbounded and if



AGRICULTURAL TRAIN
DEAN PRICE IN THE FOREGROUND.

properly farmed will remain the garden spot of the state. This year the corn crop is immense and cribs and rail pens are bulging with the corn waiting to be shipped.

Other railroads are asking for similar trains to be run over their lines and requests from farmers in all sections of the state are being received asking if similar trains cannot be run through their sections. Agricultural special train work is a new form of agricultural extension in Ohio but the indications are that it will prove very useful and an effective way of reaching large numbers of farmers.

NEWS

The Ohio State Horticultural Society

The fortieth annual meeting of the Ohio State Horticultural Society was held at the State University, January 17 and 18. The various sessions were well attended, being both interesting and profitable. Visiting horticulturists were present from Vermont, Michigan, North Carolina, Alabama and West Virginia. A wide and varied list of subjects were ably discussed. Small fruit culture, orcharding, ornamental planting, insect enemies and fungus diseases, nursery and orchard inspection, protecting crops from frost, these and many other topics made a program of unusual interest. The last session was a joint meeting with the Horticulture Club of the University, at which time Prof. Lazenby gave a report of the winter meetings of the state horticultural societies of Illinois and Missouri.

The exhibit of apples was unusually fine, comprising over 300 plates of 80 distinct varieties. This exhibit was in the charge of Mr. O. J. B. Smith, student assistant in the Department of Agriculture.

The apple judging contest at the December meeting of the Horticulture and Forestry Society was a great success. Mr. William G. Yeager won the first prize. The other contestants were A. H. McCray, J. H. Gourley, and S. N. Kerr. In addition to the judging there was a contest in the identification of varieties.

The annual meeting of the Columbus Horticultural Society was held at the State University, December 29, 1906. This society was organized in 1845, making it one of the oldest organizations of its kind west of the Alleghany mountains. Its earnest, quiet and persistent work has accomplished much in the way of promoting the horticultural interests of Franklin county. Professor Lazenby was elected president for the twelfth successive year.

Dean Price and Professor W. R. Lazenby represented the College of Agriculture at the funeral of ex-Trustee Thomas J. Godfrey, which was held at Celina, Sunday, December 2, 1906. Mr. Godfrey had been a member of the board of trustees for twenty-five successive years.

Professor Lazenby attended and addressed the fortieth annual meeting of the Horticultural Society of Illinois, at Joliet, and the forty-ninth annual meeting of the Missouri State Horticultural Society at Boonville, Mo.

The State Forestry Society held an unusually interesting meeting during "Agricultural Convention Week," and a very animated and profitable discussion followed the reading of some carefully prepared papers. The students specially interested in forestry improved the opportunity and were present in large numbers. The principal speakers were

Prof. Crumley, of Antioch College, and Mr. Horatio Markley, president of the Morrow County Forestry Society. Prof. Lazenby is president of the State Society and Mr. C. W. Waid, a graduate of the Department of Horticulture and Forestry, is secretary.

J. P. Ray, of East Bloomfield, New York, lectured before the students on Friday evening, January 18, on the "History and Development of the Merino Sheep." Mr. Ray is one of the oldest breeders of sheep in the United States. He has bred some of the most noted sheep in the history of the country and is regarded as one of the best informed men on Merinos in the United States. He gave a very enjoyable talk.

Prof. Plumb has been requested to make up the wool exhibit for the Jamestown Exposition and he has accepted the invitation. The general agricultural exhibit of which wool is a part will be in charge of the Ohio State Board of Agriculture.

During the Christmas vacation Mr. Guthrie was called to Windsor, Ashtabula county, to determine why the butter had lost its proper flavor. It was due to dust, dirt and a leaky vat.

There are twenty men enrolled for the short course in dairying.

Alumni and Ex-Students

L. M. Smith, '05, is at Raleigh, North Carolina. He has been appointed assistant state entomologist of that state.

R. R. Parret, ex-'08, is farming and feeding cattle at Lyndon, O.

Ora McCreary, ex-'08, has rented a farm near Camden, O., and will farm it this summer.

Wm. Cook, who was enrolled at O. S. U. in 1904-5, is farming at Camden, O. He is also one of the State Farmers' Institute speakers.

"Ike" Cook, '06, will assist Prof. Foord in agronomy during the winter term.

L. C. Call is assistant to the professor of soils at the Kansas Agricultural College.

J. V. Hyatt, '05, is selling horses for McLaughlin Bros. with headquarters at Henderson, North Carolina.

Fred Philips, ex-'08, is farming near Athens, O.

Otto Kielsmeyer is instructor in cheesmaking for this term. He is a graduate of the Wisconsin Dairy School and has been making cheese for a number of years.

Wm. G. Vanmeter, who was a student in the University in 1903-4, is a helper in the creamery room.

R. J. Perkins, a graduate of the Dairy School of '06, is assisting with the buttermaking. He recently worked for the Ohio-Pittsburg Milk Company at Pittsburg.

Wm. Clevenger, '06, has charge of the milk bottling department.

W. D. Waite, ex-'08, is running a dairy farm at Glenburn, Pa.

Charles A. Miner, '05, who made a specialty of forestry and is now located in Fresno, Cal., expects to make some investigations and experiments for the Southern Pacific Railroad. Tests are to be made with locust, catapla, eucalyptic and walnut.

Lloyd M. Bloomfield, who graduated in 1891, and remained at the University as an assistant in agricultural chemistry for five or six years thereafter, is now a teacher in the Philippines. Few of our graduates have had a richer or more varied experience in foreign lands.

E. J. Lichti, one of last year's graduates from the Department of Horticulture and Forestry, is now inspecting nurseries and orchards for San Jose scale and peach yellows in the vicinity of Hagerstown, Md. He is connected with the agricultural college and experiment station of that state.

F. W. Rane, '91, who has been professor of horticulture and forestry in the state college of New Hampshire for the past twelve years, is now The State Forester of Massachusetts, with headquarters in Boston. He is also secretary of the society for the Promotion of Agricultural Science.

A. S. Neal, '04, is farming at Macedonia, Ohio. Dairying is one of the principal features of his work. He has a herd of seventeen cows at the present time. We regret to hear of the recent death of his wife.

B. O. Stingle, ex-'06, is quite successful at general farming. His home is in Coshocton county. He has been doing some very valuable experimental work in cooperation with the Experiment Station. He is also Master of their home Grange and is leading in this work.

L. B. Palmer, a special student in animal husbandry a few years ago, is en-

gaged in stock farming a few miles east of Columbus. His work is principally upon Shropshire sheep. His ultimate object is to produce an animal with a high grade of wool and at the same time with desirable mutton form. This field offers splendid opportunities and Mr. Palmer is using great care in his work.

O. S. U. at the International

(An editorial in the National Stockman and Farmer.)

It has been especially gratifying to see at the last two International shows the Ohio State University coming to the front in the show ring with its fat stock and its students winning honors in the judging contests. Such things show that the University is teaching not only by precept but by example and the doing of things. The credit for this work should be given largely to Prof. C. S. Plumb, who has had the support of the heads of the College of Agriculture and the University. And we hope that nothing will mar the excellent prospect for the work in animal industry which has only fairly begun at the Ohio State University. So far no college east of Ohio has won honors at the International; but to Pennsylvania and New York we commend Ohio's example and hope that they too may be represented at future shows. It will pay them to take this work up at their earliest opportunity just as it is paying Ohio to do it.



O. S. U. LIVE STOCK JUDGING TEAM, 1906—(Photographed by Baker)

Experiment Station Notes

The department of cooperative experiments is working upon a very interesting phase of rural economics. They are using a detailed sheet which is to be filled out daily. By this method careful record is made of the time required to produce any certain crop and from this the cost of production can be easily determined.

A number of farmers are following this system in cooperation with the department. Daily labor blanks are furnished them. The various things done each day are written upon these, from which a duplicate copy is taken. One of these is sent to the station and weekly blanks are filled out, one of which is sent back to the farmer. This is a very concise method of determining the cost of a crop; and we are glad to know that some of the men who are doing this are Ohio State men.

The department of botany continues its work with seeds and seed adulterants. A large number of commercial samples of clover, alsike and alfalfa have been examined; last year the number reached three hundred. A sample from Toledo market recently showed 1.9 per cent. impurities. While not a very large per cent. the character of the adulterant was such as to make the seed very undesirable. Further, this seed had been imported from Europe, illustrating how very easily noxious weeds may be introduced onto Ohio farms by use of such seed.

The results from spraying for blight on potatoes has been somewhat variable this season. In Portage and Geauga counties the increase yield on sprayed plots amounted to 40 bushels per acre. In other counties the increase yield amounted to 20 bushels per acre. The interesting thing about this is that where this last increase was obtained,

there was no blight present on the unsprayed fields. The gain due to spraying appears to result from physiological conditions obtained by the spray upon the plant.

The plant breeding work which is being done is bringing out some interesting results. In the corn work, No. 175, which is a cross between Clarage and Reed's Yellow Dent shows signs of many desirable qualities. The Dent variety will not mature at the station, but this cross matures very nicely. Further, this year's yield exceeds that of the varieties named. The yield was 95 bushels per acre.

One hundred and fifty crosses of wheat have been experimented upon this last season. Three have gained admittance into the variety test. No. 160 is quite promising, it having yielded higher than the Gypsy which was taken as the standard.

Tobacco breeding at Germantown has been in progress. A hybrid between the Commercial Seed Leaf and Cuban outyielded either of the parent plants. The quality of this cross is yet to be determined.

The department of forestry is rapidly extending its work. The southern counties offer splendid opportunities in the line of woodlot improvement. Jackson county has immense tracts of fine second growth, which has grown in the last thirty-five years. The owners of these tracts are very much interested so the opportunity for doing work is very encouraging. Another factor, and that is the fact that these lands are unsuited for farming, makes the growing of timber of considerable importance.

Bulletin 176 has just been received. It is the twenty-fifth annual report of the station. It contains a meteorological summary for the year 1905-1906.

The expenditures and incomes of the station are worked out in concise form so that the reader may know where and how the money appropriated for this work is spent. The report of the director gives the number and name of thirteen bulletins published during the past year; also of seventeen circular publications and ten press bulletins. The press bulletins are printed in full; these are short articles of information upon questions that were of special interest to farmers at that time.

Mr. Ballow states that the strawberry variety bulletin is ready for the press and will be issued in a short time. The spraying of strawberries for blight gave rather unexpected results. Those that were unsprayed produced as many or more berries than those that were sprayed. He believes that this result was due to the thickness of the vines on the unsprayed rows, the blight having killed quite a per cent., left those that withstood the attack about thick enough for the maximum production. On the sprayed rows the plants were too thick for the best production.

Why Not be a Dairyman?

Why do not more of us go in for dairy farming? The answer usually is that it is too confining or it is the same old problem of farm labor. In our mind it is a settled fact that there is no legitimate business that a man can go into which he does not have to give the greater part of his best time and attention in order to make a success of it, and we think the dairy business is no exception to this rule, considering the degree of success that can be attained with proper management. In order that a man may properly manage his business it is necessary to thoroughly understand it. He must be a student not only of the cow in order that he

may get the milk, but of the milk also, that he may know how to handle it after the cow has produced it.

Certainly all of this requires work, and regular plodding work, too. Yet, when you meet a man who is a successful dairyman, it is a pleasure to talk to him. While he has his problems, yet he is not worrying about what is going to become of his farm because the cow is taking care of that for him, and in a way that no other agent can do it.

Of course, along with this comes the problem of farm labor, which we are solving in a more or less satisfactory way by the intelligent use of improved methods and machinery. Until a few years ago the aims of the inventor of farm machinery (and of course the demand made it so) was to produce machines that would sow and harvest enormous crops in a very short time, and so long as the soil was in good condition, and many people seemed to think it would always be so, the farm help problem was very much relieved. But the time has come when we must return something to the exhausted soil that it may produce the crops that it used to do. In our time of need, we turn to the cow as the machine best fitted to bring our soil back to the virgin condition that it may produce the crops to feed the people who must be fed. We are very glad to say that the demand for improved methods and machinery to do this new work has not failed to produce to a more or less degree what is needed along this line.

Dairy education, cream separators, milking machines, suitable power in the way of different kinds of engines, all tend to make the work lighter and more profitable than ever before.

Let us look into the dairy business. There are many good things that we are so apt to pass by because we only see the surface.

Crude Petroleum as a Preventative Against Frost

Strawberry growing in West-Central Pennsylvania is a very uncertain crop. owing to the injury resulting from frost during the blossoming period. Taking the past ten years as an average, three crops out of five is as much as the grower can expect under natural conditions. To raise our crop average to a higher paying basis we looked around for some practical and inexpensive method of protection against the late spring frosts. The term frost as commonly used is the freezing of dew. Frost is formed when the dew point reaches the freezing point (32 degrees). The dew point is the temperature at which the depositions of moisture begins. This is determined by the use of the psychrometer (wet and dry bulb thermometers) in connection with a prepared dew point table to which the readings of the psychrometer are compared. When the dew point is ten degrees or more above the freezing point at nightfall, there is little danger of frost the following night, but if less than ten degrees above the dew point frost may be expected. The supplying of water vapor to the air during nights of probable frosts is one of the most efficient means of protection. Finding this impractical under our conditions we resorted to the various smudges, first using fine bituminous coal and wood, dampened with water. This was only partially successful owing to the inability to create sufficient numbers of small fires, instead of the larger ones, as we were obliged to build. The larger the fire the stronger the upward draft, which was the very thing we were trying to avoid. We tried resinous, or more commonly called pitch-pine wood, which was very satisfactory when it could be had in sufficient quantities, but owing to the scarcity of supply we

abandoned this. The use of crude petroleum and sawdust was brought to our notice by a friend visiting from California. Being in close proximity to the oil fields we had no difficulty in securing a quantity of oil for experimenting. We made numerous experimental tests with the oil and sawdust in producing a smoke, varying the proportions of oil and sawdust in the different trials. This being necessary, owing to the variation in composition of the Pennsylvania oils and that found in some other parts of the country. One part of crude petroleum to two parts of sawdust was used in our first practical test during the spring of 1902. Sheet-iron cans (empty powder cans) holding about three gallons, were used, those being most economical to secure at that time. In each can we put about two gallons of the mixture and distributed the can along the windward and partially along the two adjoining sides of the field, placing the cans about thirty feet apart. When the temperature came to within several degrees of the danger point the fires were started by using an small piece of the resinous pine for each can. They were kept burning all night, a fresh supply of the mixture being added to the cans from time to time as needed. The result was entirely satisfactory, having saved our crop as well as a part of a neighbors on the windward side. The strawberry crop of the county was reduced fully sixty per cent. that year on account of that particular frost. The cost of material and application was 3.4 per cent. of the net profits from the crop. The following year preparations were made to not only protect the strawberries, but also the sour cherries and early vegetables. The climatic conditions were such that the use of the smudge was not necessary. In 1904 the oil was used with greater success than before, due to the better

equipment for doing the work. The cost of material and application was 2.5 per cent. of the net receipts from the crops protected. Shallow iron pans are used at present as they are more durable than the sheetiron used the first year.

The material is mixed in a large vessel and the pans filled before taken to the field. The distribution of the pans as well as the re-filling is done from a low wagon. We have found the smudge to be unsatisfactory in narrow, deep valleys. The cooled air from the hill-sides flows down underneath the smudge, killing the plants. Where the valleys are broad or the topography comparatively level, much damage from late spring frost to the fruit grower and truck gardener can be averted by the liberal use of smudge at the critical moment. It is well to have a few thermometers scattered through the orchard and gardens and the weather condition carefully watched at that time of the year when damaging frosts may be expected.

W. G. Yeager.

Confinement vs. Open Lot for Feeding Cattle.

The observations given here are not the result of experiments performed by the writer. However, the results are much more to be relied upon than those obtained by the experiments of any one individual. They were obtained by various experiment stations situated in different parts of the country and the utmost care was exercised.

We have tried to avoid statistics and figures as much as possible, but have found that in an article of this kind it is impossible to totally ignore tabulations and figures.

For our information we are indebted to several experiment stations, each of which will be referred to in connection with the results they have obtained.

The experiment given precedence is one performed at the Ohio Station, because the conditions there as to climate, are practically our own; though this experiment is not as exhaustive as we could wish for.

The cattle confined were kept in a barn which had the cracks battened and was fairly comfortable. The cattle inside were chained in box stalls facing each other and stood on a plank floor.

Those fed in the open had access to a shed which was closed to the north and east, but open to the south and west. The following is the average outcome of this comparison:

Treatment	Initial weight	Daily gain per steer	Dry substance consumed per lb. of gain	Cost of food per lb. of gain
Fed in barn..	960 lbs.	1.99 lbs.	10.20 lbs.	7.27c
Fed in shed.	876 lbs.	1.93 lbs.	10.53 lbs.	7.33c

The result obtained at the Ohio Station does not indicate any material difference in the most of food per pound of gain. The food, however, is not the only thing to be considered in the cost of gain. The cost of caring for those in the yard is less, especially when there is running water accessible. While the saving of manure in the barn deserves consideration, the difference in this instance would depend a great deal on the value one places on their manure and the cost of labor for the caring of the stock.

Next to Ohio, Pennsylvania most nearly represents our climatic conditions.. The conclusion arrived at, at this station is as follows:

The lot fed in the open produced a slightly smaller gain and at the expense of a somewhat greater amount of feed. It is not clear that the low temperature of the shed was the cause of the difference. The period of two weeks that the lot in the shed made the smallest gain except one was the period of highest temperature. In the period they made the largest gain except two the

temperature averaged the lowest (29 degrees), the two periods in which they made the greater gains had average temperatures of 40 and 35 degrees. The lot in the yard were at a disadvantage. The drainage from an embankment passed under the shed and made it impossible to keep the bedding dry. The lot was also muddy and disagreeable.

On the whole the lot in the barn appears to have given slightly better results. The differences are not very marked and in view of the wide difference observed between individual animals it is not at all impossible that the selection of animals and the conditions surrounding had as much to do with the result as the mere exposure to the cold.

The food cost of a pound of gain in the lot was .842 cents more than in the barn. As I have said before the food cost does not represent the total cost. The investment in a warm barn represents a much larger amount of money than that invested in an open shed and of course there is the labor in caring for them to be considered.

At the Kansas Station an experiment was carried on which is more in favor of the barn. Five steers were kept in the barn and fed the same kind of feed as five that were kept in a lot with access to a shed open to the south. The cost of feed and the cost per pound of gain from November 30 to May 30 of the two lots were as follows:

Records of each individual could be kept of those confined to the stalls, which was impossible in the case of those running together in the lot:

LOT IN BARN.				
Number of steer	Total cost of feed	Gain in 182 days	Average daily gain	Cost per lb. of gain
Number 3	\$20.743	210 lbs.	1.15 lb.	9.28c
Number 7	20.20	324 lbs.	1.78 lb.	6.23c
Number 8	16.882	274 lbs.	1.50 lb.	6.16c
Number 12	23.447	309 lbs.	1.77 lb.	7.58c
Number 19	22.901	304 lbs.	1.67 lb.	7.53c
LOT IN YARD.				
Total cost of feed	Gain in 182 days	Average gain per head	Average daily gain	Cost per lb. of gain
\$126.01	1,564 lbs	312.8	1.71	8.05c

To produce one pound of gain in the yard, on the average, it took the following feed: Ear corn, 15.3 lbs., fodder, 2.8 lbs., hay, 2.1 lbs. To produce a pound of gain in the barn it took: Ear corn 14.1 lbs., fodder, 4.7 lbs., hay, 1.7 lb.

When the average farmer takes a look at the cost of producing a pound of gain in either of the above tests he can find at least one good reason why it is better to let the experiment stations perform such experiments; unless his desire for knowledge obtained at first hand overbalances his desire for financial gain.

The Utah Station is one which has in all probability given more care and attention to this question and the seventh year's work at that place is given here in some detail.

In the experiment there were three groups of cattle use. Lot No. 1 was fed in the open air, Lot No. 2 in box stalls 6x9 feet in which they were permitted to move about, Lot No. 3 was tied by the neck. The last two lots stood in the barn on a plank floor. Below is a brief summary showing the amount of gain:

	Lot No. 1	Lot No. 2	Lot No. 3
Weight Nov. 30 to Dec. 1 and 2....	2,237 lbs.	2,249 lbs.	2,259 lbs.
Gain for preliminary period to Dec. 23	54 lbs.	89 lbs.	71 lbs
Gain Dec. 23 to Jan. 25	144 lbs.	195 lbs.	144 lbs.
Gain Jan. 25 to April 13	317 lbs.	19 lbs.	210 lbs.

During the preliminary period those fed in the open air gained less than the others and were probably no better feeders than the others which they later outgrew.

Up to January 25 each lot was given the same amount of food. No. 1 in the open ate all that was given and gained no more than the lot tied up and less than those in the loose boxes which did not eat all that was given them.

Hence they required more food for less growth than those tied up in the barn without exercise. The lot tied up and those in the boxes exchanged places February 1. Those changed into the loose stalls gained 134 pounds from February 1 to April 11, while those taken from the loose stalls and tied by the neck gained only one pound. This gain coupled with prior results is a demonstration that exercise is indispensable to the best results in feeding and that with the gain of outdoor fed steers enters prominently the question of exercise and appetite.

After January 25 the lot in the open were given all they would eat. They ate much more and the foregoing table shows they gained much more as a consequence of the exercise and appetite. They exceeded the gain of the lot in the barn having limited exercise. This question can only be discussed in connection with the amount eaten:

Lot	Food eaten Nov. 30 to Dec. 22	Ate to Jan. 25, dry food	Ensilage	Ate from Dec. 22 to Feb. 1, dry food	Ate of ensilage to Feb. 1	Ate Jan. 25 to April 13, dry food	Ate ensilage Jan. 25 to April 13
No. 1.	1,270	1,088	3,072	2,767	5,684
No. 2.	1,262	914	2,072	1,098	3,732	1,181	5,684
No. 3.	1,239	773	372	903	3,732	2,193	5,684

During the preliminary period the food eaten by each lot was practically the same.

During the period ending January 25, though fed in like amounts, the dry food eaten by the lot tied up was 315 pounds less than the lot fed out of doors and 241 pounds less than those fed in the box stalls.

For the 33 days there was a tax of cold weather amounting to 105 pounds of food per steer on those in the lot for their gain was only the same as those tied up. For this period the saving paid good interest on the shelter.

Those in the box stalls ate 174 pounds less than those in the open and gained 57 pounds more. Those in the boxes gained 51 pounds more and ate 141 pounds more food than those tied by the neck. This is not far from the equivalent of the gain of food of the lot tied up over the lot in the open. Therefore, there is concord of the two lots in the barn in showing that the lot in the open required some 105 pounds of extra food per steer in 33 days to keep the heat of the system as compared with those sheltered. But the food eaten by those in the open air was food those indoors would reject, and an economic factor is introduced that will vary with the character of the food given. Those in the box stalls changed places with those tied up on February 1. Those in the boxes had gained from December 22 to February 1. A marked change is noted from now on favoring the loose stall compared with the tie stall.

I think all the experiments given will lead one to the conclusion that which ever method he pursues largely depends upon his equipment and the ease with which he can obtain labor—either his own or hired labor.

Perhaps as good a manner of feeding as could be followed would be a combination of the two methods, allowing the cattle the privilege of warm quarters and an opportunity for exercise in an open lot. If the lot contains running water and is comparatively dry it is much better and more economical.

Gus. L. Elliott.

Early Spring Plowing

The benefits of mid-winter plowing are quite marked in many places in Ohio. The subject needs considerable comment. However, it will be postponed to some future issue of THE

STUDENT, and a few facts concerning the early spring plowing will be noted. We wish to call attention to some facts published in a thesis worked out by Modesto Quiroga two years ago:

The subject of soil fertility and the process of setting free plant food have received a great amount of attention among agricultural scientists during the last few years, and it was with the hope of determining something of the effect of early and late spring plowing upon soil processes as shown by crop production that this investigation was begun. The object was to study by actual experiment the influence of early and late spring plowing upon corn production and to determine if possible the causes of such differences as might be found to exist.

Some experiments were conducted on the University farm, the area concerned including about three acres of the large tract of alluvial soil lying along the Olentangy river. The soil is characteristically alluvial in nature and forms the first bottom lowland of the area now under cultivation. The level character of the land avoids serious washing when overflows occur, the average depth is about six feet, and the whole is underlaid at various depths by a bed of gravelly subsoil which insures natural drainage. Mr. C. B. Hoover, in his "Soil Types of the Ohio State University Farm," classifies this soil under the head of "silt loam" and states that "from an agricultural standpoint this is by far the most important land of the farm. It is all underlaid by gravel at depths varying from four to ten feet and is thus naturally well drained."

Previous preparation of the ground:

The land had been cropped in rotation for several years. In 1900 the field was in a timothy and clover meadow. Previous to that year there had been a

crop of wheat taken off. For a number of years before the wheat crop, the field had been used by a seed firm for the growing of tomatoes and had been heavily manured during that time, but no manure has been applied since. In 1902 it was turned into a corn field. At the time of harvest the ears were stripped and part of the stalks left standing in the field.

The season of 1903 was extremely dry and hot, with only 13.36 inches of rainfall from April 1 to September 30. The rainfall for April and May, the time before seeding, was 5.27 inches, that is, .32 inch less than that recorded for the months of July, August and September together, which only amounted to 4.95 inches. The precipitation for June, the time of planting, was 3.14 inches, which together with that for the last three months makes a total of 8.09 inches of rainfall for the growing season of our experiment. The driest month of the season was August, with only .63 inch of rain, .22 inch being the highest single rain record for the month.

Working the ground, seeding and Cultivation: On April 2, 1903, the land was rolled and disked to get the cork stalks in order, so that it could be plowed under. On April 7, the early plots A and C were plowed with an Oliver Chilled breaking plow to a depth of five inches. On account of rain the other early plote (E) was not ployed until April 10. Then the plowed land was dragged with a plank drag and left standing in that condition until April 22, when it was harrowed with a drag harrow. It was then left until the date of preparation of the plots for seeding. On June 3, the late plots B, D and F were plowed. Then the whole field was disked with a rolling cutter harrow, and finally rolled with a tubular roller. On June 4, the corn was drilled with a two-horse planter.

The corn was cultivated three times during the season, once in June and twice in July. The work of cultivation was carried out as follows: First, the drag-tooth harrow was used; second, the two-horse riding cultivator, and third, the two-horse walking cultivator of the Malta make. The average depth of this cultivation was from two to three inches, supposed to make a level cultivation. Weeds were cut out with hoes on July 25, 26 and 27. With the exception of the time of plowing, the plots—early and late—were treated practically alike, being plowed at the same depth, ground prepared in the same manner for planting, planted at the same time and cultivated in the same way and as near the same time as possible.

The work of the season has covered four different lines of study; first, soil moisture, second, variation of nitrates, third, temperature of the soil, and fourth, crop. All of them have been referred to the main statement, that is to "The Influence of Early and Late Plowing Upon Corn Production."

The following table shows by plots the relation between moisture and crop yields:

Plot.	Seasonable ave. per cent. moisture	Corn Yield in Pounds.		
		Corn and Fodder	Corn	Fodder
Early .. A	20.18	4042	1121	2871
C	20.18	3344	955	2389
E	20.93	3800	1211	2589
Late .. B	19.38	3545	875.5	2670
D	19.03	3360.5	841.5	2519
F	20.19	3565	937	2628

Results obtained:

The object of this investigation was to determine the influence of early and late spring plowing upon crop production. The study was carried along the lines of soil moisture, available nitrogen and soil temperature. The results found show:

First. That the crop yield from the early-plowed land is more than that from the late, at the rate of 6.6 bushels per acre.

Second. That there is a very strong concordance between the yield per acre and by plots, and the amount of moisture per cent., and available nitrogen found in the soil during the season.

Third. That the moisture-holding power of soils is greater with the early plowed land at one, two and three feet in depth than that of the late, the greatest difference in its favor being found in the surface foot.

Fourth. That when the moisture content of this particular soil falls below 12 per cent., the leaves of many plants curl early in the day, and the plant turns a yellowish color and is more or less checked in its growth.

Fifth. That nitrification takes place, with a gradually decreasing intensity, at one, two and three feet in depth.

Sixth. That the seasonal average amount of available nitrogen found for the early-plowed land in the surface-foot is twice that found for the late at the same depth.

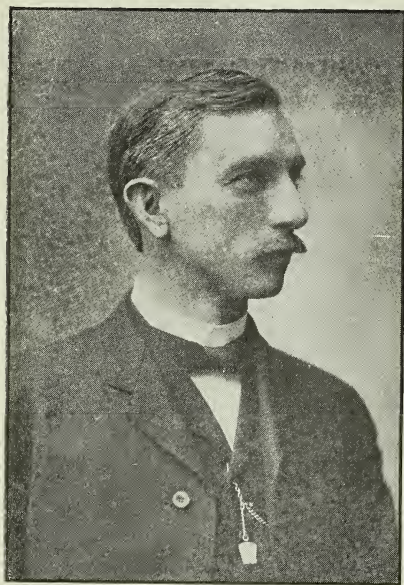
Seventh. That the available nitrogen in the surface-foot of the early-plowed field is four times that found in either the second or third foot, early or late land.

Eighth. That the mean soil temperature for the early-plowed land is in all cases during the entire season, lower than that found for the late period.

Ninth. That the low mean soil temperature found for the early plowed land is accompanied throughout the season by a greater amount of moisture and available nitrogen than is the case with the late plowed which has the higher temperature.

Tenth. That in many cases a high temperature is followed by a high rate

of nitrification, while in others it is not, thus suggesting that the process of nitrification is more or less dependent upon what may be called the rate relation between the water content and the temperature of the soil, provided other factors are favorable.



PROF. A. B. GRAHAM

Professor Graham has charge of the Rural Extension work at O. S. U.

Gardening Note.—To remove gold bugs, use dynamite.

The Ten Weeks' Students Became Wise

A few days ago some upper classman placed a notice on the bulletin board in Townshend Hall for all the ten-week's students of the Agricultural College to report at Professor Thomas's office at a certain hour. About fifty of the more obedient students reported immediately.

Agricultural Note.—Wild oats make the only crop which flourishes best by moonlight or gaslight.

Importance of the Merino Today

There was a time in the history of the Merino sheep when they were raised entirely for their wool production. The people were "wool crazy," and sheep were produced that would shear wool weighing one-fourth the weight of the animal. They were produced with the eyes of the breeder entirely upon the wool production in amount and quality and very little attention was given to the mutton qualities of the sheep. The heaviest wool producer brought the best price in any market.

This was before sheep were fed and bred for mutton as they are today. With the cultivation of the taste of the people for mutton starting in England and spreading over almost the entire globe, a change came about in the sheep business. The wool production was not by any means entirely ignored, but there must go with a fair fleece, mutton qualities which would be acceptable to the consumer. Baby mutton production became a business. Lambs were fed and marketed before they were a year old. This condition has been growing steadily up to the present time. The sheep of the middle wool class are the popular sheep and it is quite generally accepted that the Merino falls behind them as a general purpose type. These middle wool sheep produce a good sized fleece of fair wool and their mutton qualities are in excess of those of the Merino. For some time commission men have been advising the extended use of the middle wool sheep in founding flocks to produce wool and mutton. At the present time they see their mistake, which may be noted from a statement made by Roscoe Wood in an article in a recent issue of the American Sheep Breeder, where he quotes a

commission man whom he calls one of the best handlers of sheep. He says in substance that sheep are coming into the stockyards that are inferior to those brought in some years ago and gives for his reason the increased use of the coarser sheep which he himself with others had been advising and says that if farmers want to make money in sheep they should build up their flocks on a Merino foundation.

Some of the open wooled sheep may when seen on exhibition seem to be the very ideal for everybody to produce. However, not everybody can produce show sheep. Put these mutton sheep on the average farm alongside the Merino. Do they keep up with the Merino? No. The Merina has been bred pure for hundreds of years and there seems to be a stamina about them that shines through very adverse conditions. They rustle for themselves where the coarse sheep would retrograde. Stomach worms do not bother them and if bred to a ram of the mutton type they produce lambs entirely acceptable to the feeder and consumer. They will breed to produce lambs at various time of the year. This fact is taken advantage of by a prominent producer of hot house lambs in this state. The big sheep men of the west want Merinos to found their flocks.

The man who is not making a specialty of sheep, the general farmer, will undoubtedly find the balance on the right side of the ledger at the end of the year if he will stick to the old Merino. The breed is growing in popularity every day. There was much evidence of this in the enthusiastic meetings of the American Delaine-Merino Record Association held in Columbus on January 17, 1907. C. E. S.

Honey

ARTHUR H. M'CRAY.

Honey is described by the dispensatories as follows: "A saccharine secretion deposited in the honeycomb by *apis mellifica*. Linné. (Class Insecta, Order Hymenopteria) U. S.) *Apis mellifica* as is well known is our common hive bee. It will be seen from the above definition that no mention is made of the source of the honey, whether nectar from flowers, or an artificial mixture of sugar and water fed to the bees. Needless to say that honey to be acceptable as such must be gathered from flowers. Such honey would have the aroma of the volatile oils found in flowers, and making it the exquisite product that it is, for while honey has considerable food value as will be shown later, we believe that it is consumed largely for its fine flavor. The flavor and character of honey are very much affected by the nature of the plant from which it is obtained, so that it is not surprising to hear of poisonous honey being secured by the insects from poisonous plants. In the memorable march of the ten thousand Greek soldiers to the sea, Xenophon tells how some of them were taken seriously ill by eating poisonous honey. Among the plants yielding poisonous honey are mentioned (1) the mountain laurel growing in Virginia especially near Halifax, C. H.; (2) the yellow jasmine, found in certain localities in Georgia, particularly in the vicinity of Augusta.

Honey is gathered by the bees from the flower nectaries, by lapping or sucking by means of the tongue which is 0.2 to 0.28 inch in length. The liquid nectar as found in flowers is quite thin, while good honey in the hive as is well known, is rather dense in consistency, especially old well ripened honey. The

water of the nectar is supposed by some to be partly eliminated by the worker bee, while on the way to the hive, as some observers have reported seeing bees ejecting a watery substance in flight, while returning to the hive from the fields. The honey is further evaporated, after being stored in the open cells of the honeycomb, being sealed over when sufficiently evaporated. This inside evaporation process is performed by the workers fanning currents of air through the hive by their wings, and the roar of a yard of bees can often be heard in the summer time far into the night. This fanning also, no doubt, serves to mitigate the excessive heat generated by a large colony of bees clustered so closely together. While this ripening process is going on inside the hive, the honey may be frequently moved from one comb or part of comb to another, perhaps to give the use of certain desirable combs to the queen for the deposition of eggs, or it may be part of the ripening or evaporating process. In this inside manipulation of honey it seems that formic acid in minute quantities is added to the honey. Chemical tests show the presence of formic acid in well ripened honey, but none is found in freshly gathered nectar of flowers. This formic acid is supposed to be an antiseptic, preserving the honey, although this preserving action of the acid is doubted by some. Certain it is that formic acid is present sometimes in honey, and that there are certain glands in the head of the bee secreting formic acid.

Honey has, on an average, the following composition: Carbohydrates, 81.2 per cent.; water, 18.2 per cent.; protein, 0.4 per cent.; ash, 0.2 per cent. A little wax and as before stated certain aromatic bodies are also found. The presence of dextrin in pure honey

seems to be established. The carbohydrates are made up of dextrose and laevulose in about equal proportions, which explains the superiority of honey as a part of the diet, over the use of cane sugar, i. e., in honey the cane sugar of the nectar in the flower has been transformed by the bee into "invert sugar," while when cane sugar is taken into the human stomach, this inversion must be performed by the digestive organs of our own bodies, instead of, as in honey, having it previously done by the stomach of the bee. In the excessive use of cane sugar, a great tax may thus be put upon the digestive tract.

Honey has a fairly high fuel value—on an average 1520 calories. It is wholesome and laxative in effect, and if taken in place of so much cane sugar there would certainly in some, perhaps many cases, be a relief for the digestive organs. There are, however, some persons, who in health, owing to some idiosyncrasy, cannot eat honey without distress. This distress may be very great as some of us no doubt know from experience, but if one likes honey and desires to eat it, persistence in the attempt to eat it by taking small quantities at a time, we believe may in some cases, perhaps most cases, result in a disappearance of the bad after effects.

Honey, like many other good products of commerce, is sometimes adulterated. This must occur, of course, in the liquid or extracted form of honey, or "strained honey," as it is sometimes erroneously called. To be absolutely sure of getting pure honey, comb honey would perhaps need to be purchased, as it is not manufactured (as some suppose) any more than hen's eggs which will hatch out chickens are manufactured. However, we believe that very little honey sold as such, and labeled

plainly as such, is found upon the open market today. True there are many so-called compounds of honey on the market, the object being to deceive by printing the word honey in large, attractive letters, or otherwise resorting to trickery, in order to mislead and misconstrue as to the real nature of the article.

Some tests are here given which may prove of some value in testing for the purity of extracted honey, if carefully made. Cold water dissolves honey readily, alcohol with less facility. When fresh, honey is fluid; but if kept for any length of time it is quite apt to form a crystalline deposit, and finally to be converted into a granular mass. The specific gravity is about 1.333 (Duncan). When new honey is diluted with two parts of water the resulting liquid should be almost clear, not stringy, and should have a specific gravity not lower than 1.100 (corresponding to a specific gravity of 1.375 for the original honey). If one part of honey be dissolved in four parts of water, a clear or nearly clear solution will result, which should not be rendered more than faintly opalescent by a few drops of silver nitrate test solution (limit of chlorides) or of barium chloride test solution (limit of sulphates). If one volume of honey is added to one volume of water, and a portion of this liquid is gradually mixed with five volumes of absolute alcohol it should not become more than faintly opalescent (as compared with the reserved portion of the solution) and should neither become opaque, nor deposit a slimy substance on the inner walls and bottom of the test tube. If artificial glucose is suspected, Fehling's solution may be used as a test. Starch as an adulterant is easily detected by its settling to the bottom where the honey is dissolved in water. The ther-

apeutic action of honey may not be so great as sometimes made out perhaps, although it has its place as a medicine as in mixtures for allaying colds, and in various agreeable cooling drinks used in febrile and inflammatory effusions. The chief value of honey certainly lies in its being a wholesome article of diet, furnishing the carbohydrates needed constantly by the body, in most agreeable form.

The Shetland Pony

S. N. KERR.

The Shetland pony is a native of the Shetland Islands. These islands are located about two hundred miles north-east of the coast of Scotland, and belong to Great Britain. They consist of several islands and occupy an area of about 500 square miles. The topography of the land is very rough and rocky, especially near the coast, some places being impassible to man.

The soil is poor and vegetation scant. Severe damp winds blow over the islands from off the sea and cause the climate to be bitter cold and disagreeable.

It is not known how long these ponies have been on the islands, but early history makes mention of their existence there; we may readily see from this how the characteristics of the Shetland pony became so well fixed through this period of time, and how environment moulded him into diminutive size, made him compact and gave him much constitution.

At only one time have we any record of the infusion of foreign blood; this was as early as the sixteenth century, when some fine Spanish horses were introduced, which gave beauty to the pony.

In Scotland and England, the Shetland pony is put to much use, especially

in the coal mines, where his services are indispensable on account of his size and hardness.

In the United States the "Shettie" is thought of more as a pet, and for childrens' use. He is valuable because he possesses a mild and gentle disposition, miniature size, soundness of feet and legs, strong body, fleetness and wonderful endurance. These qualities make the Shetland the most remarkable and popular of all ponies.

They are of different colors, mostly bay, brown and black. Many are marked with white spots. The average weight of the pure Shetland is about 400 pounds when mature. They are very strong and sure footed, possess an intelligent eye, full forehead covered with a long thick foretop. Their mane and tail are also heavy. Their form is so compact and symmetrical that we rightly call them handsome, and it is no wonder they so completely fill the eye of a child.

We must recognize the fact that there is an increasing demand for these little beasts, and that the demand is greater than the supply.

There are only about 1200 ponies on the Shetland Islands. Two hundred and fifty are raised each year, and from thirty to sixty exported from Shetland and Scotland annually to the United States. The first importation was in 1885, since that time it has been more or less regular.

In the United States there are less than twenty-five men who donate all their time to raising Shetlands. So it is apparent that the pony market is not flooded, at least we will see this to be true if we attempt to purchase a good Shetland.

The average male colt at the age of five months will bring from forty to

sixty dollars and the female ten to twenty more.

It is of as great importance that the Shetland pony be registered as it is with other live stock. The pedigree always helps to sell the pony.

In 1892 the American Shetland Pony Club was organized. A pony more than forty-six inches in height is not eligible for registry. It seems that the more inches we take from his height, the more dollars we can add to his price.

There are less than 900 registered Shetland ponies in the United States today. If we figure how many are raised here every year, and add to this the number imported, we will find that the total number is small compared with the number that could find a good market, or with the number of children that could have the so much desired pony.

The facts that Shetlands are so hardy, free from disease and blemishes, require so little care, consume so little food, need so little shelter, and demand such a good price, give all the more reason to believe that it would be a profitable adventure for those who have a liking for such work.

Brome Grass (*Bromus Inermis*)

This is one of the most successful grasses, for some regions, which has been introduced into the United States. Brome-grass is a native of Europe and Asia, ranging from France eastward to Siberia, growing along the roadsides, river banks, borders of fields and woods, and upon sterile hillsides and pastures. In a few years it forms a very tough sod, for the grass is perennial with strong creeping rootstocks.

The early agriculturists of Europe failed to realize the value of this supposed weed on account of the habit of

the roots. In 1884, however, Stebler and Schroeter demonstrated by experiments conducted for thirty years at Magocs, Hungary, that it had the power to withstand long periods of drouth when all other grasses succumbed.

These experiments resulted in the introduction of the grass into Hungary, where it has been cultivated ever since. Its introduction into the United States must have taken place about the same time; for we find the seed offered for distribution in bulletin 22 of the California Station, issued November 5, 1884, and the statement made that it would do well there either with or without irrigation.

The seed is very light and chaffy, weighing only fourteen pounds to the bushel, which makes it difficult to feed satisfactorily through an ordinary seed drill. The most common plan is to sow the seed broadcast by hand at the rate of eighteen to twenty pounds per acre and harrow it thoroughly with a fine toothed harrow. In the South it is sown in the fall for winter pasture, but in the North it is sown in the spring.

As it is thoroughly permanent and grows with wonderful rapidity, producing heavy crops and luxuriant pasture, its value to the farmers of dry regions can not be over-estimated. All kinds of stock eat it with relish and the chemical analyses made show that it is rich in flesh-forming ingredients. It is very hardy and not injured by severe spring and fall frosts when once established. As it starts to grow very early in the spring before any of the grasses upon the native prairies show any signs of life, and remains green far into November, it will supply the longfelt want of early spring and late fall pasture. An Iowa bulletin states that the grass starts early

in the spring and affords good picking nearly as early as bluegrass.

Prof. James Atkinson says in regard to it: "Owing to its extreme hardiness it is one of the first plants to begin to grow in the spring when once established. In case of one-year-old sod it began to head out six weeks after it began its growth. The production was five tons per acre, but it must be remembered that the soil upon which this was grown was very rich."

The yield of hay from brome-grass varies from one to four and a half tons per acre according to climate, soil, etc. The grass was first reported to produce fine meadows of long standing, but such has not been found to be the case among a great many farmers. However, there is no grass which can produce an excellent meadow and pasture at the same time. It does produce a fine crop of hay for two or three years, but the third year it becomes so sod-bound that it does not produce any seed, though it continues to produce an excellent pasture.

Palatability is perhaps the most important characteristic of a grass. Although brome-grass is not as palatable as bluegrass, it needs some attention if stock will eat and fatten upon it.

Stebler and Schroeter, who conducted a number of experiments with it, write as follows: "This must be a good fodder grass, especially for sheep, because it grows in the sheep district of Ascherleber, renowned for its exceedingly tender mutton."

Brome-grass has beyond a doubt a very wide range of adaptability. It has been tested by many experiment stations, from Canada and North Carolina to Mississippi and California.

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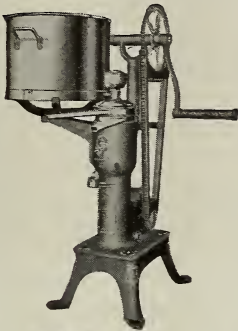
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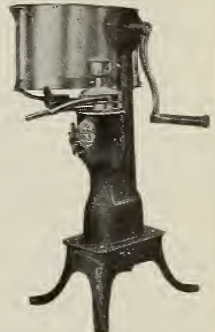
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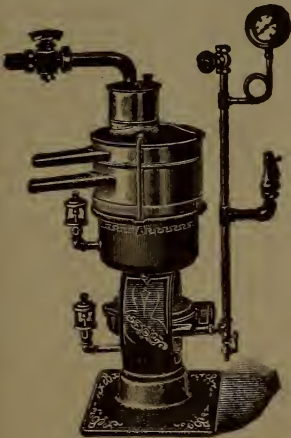
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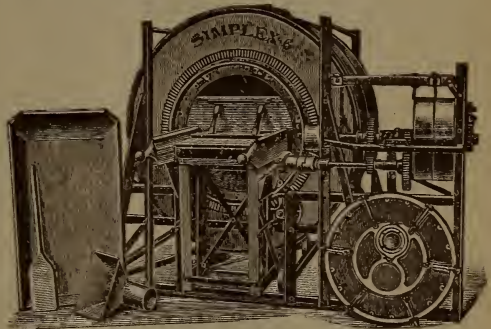
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